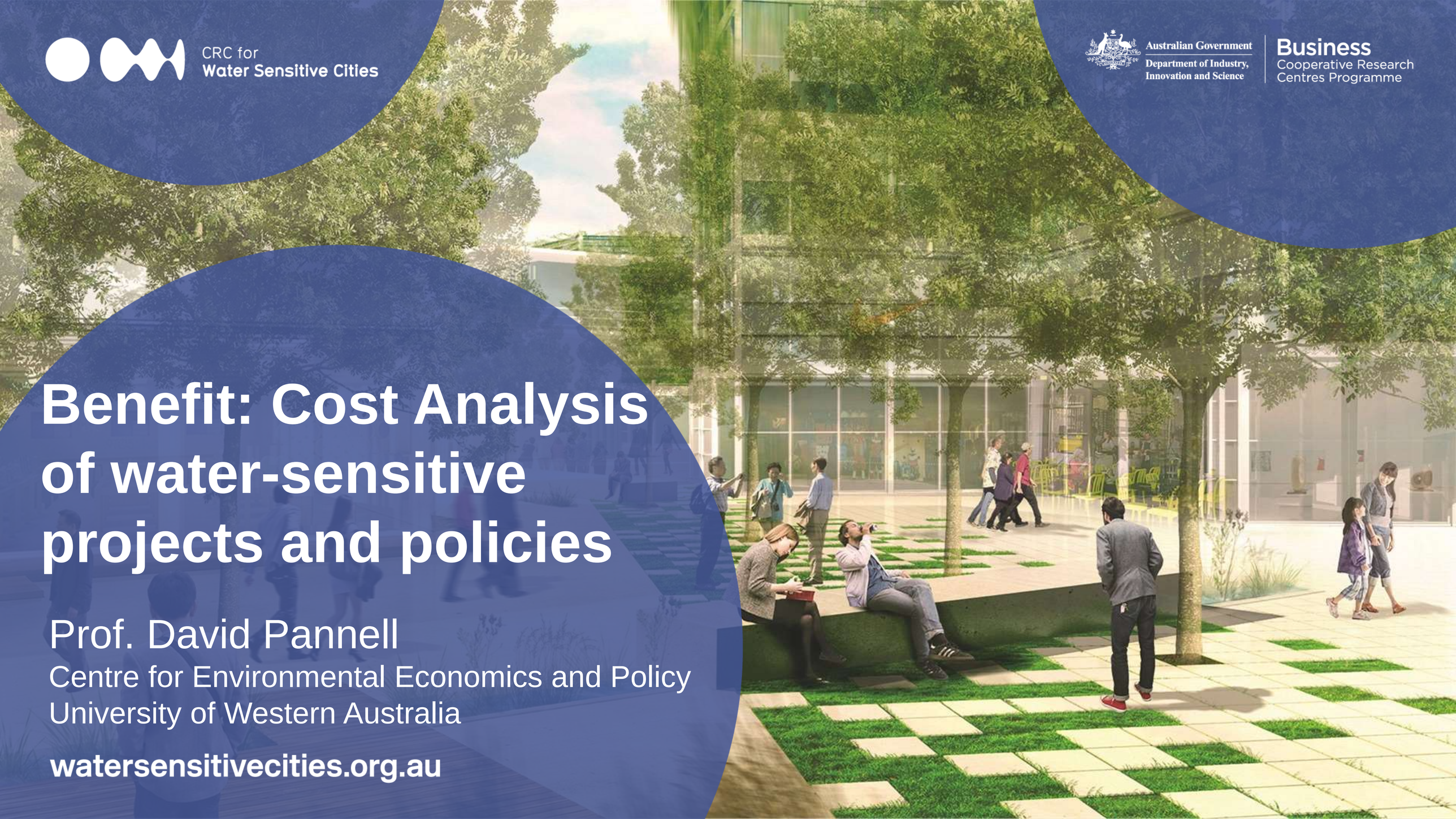
CRC for
Water Sensitive Cities

Australian Government
Department of Industry, Innovation and Science

Business
Cooperative Research
Centres Programme



Benefit: Cost Analysis of water-sensitive projects and policies

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Background

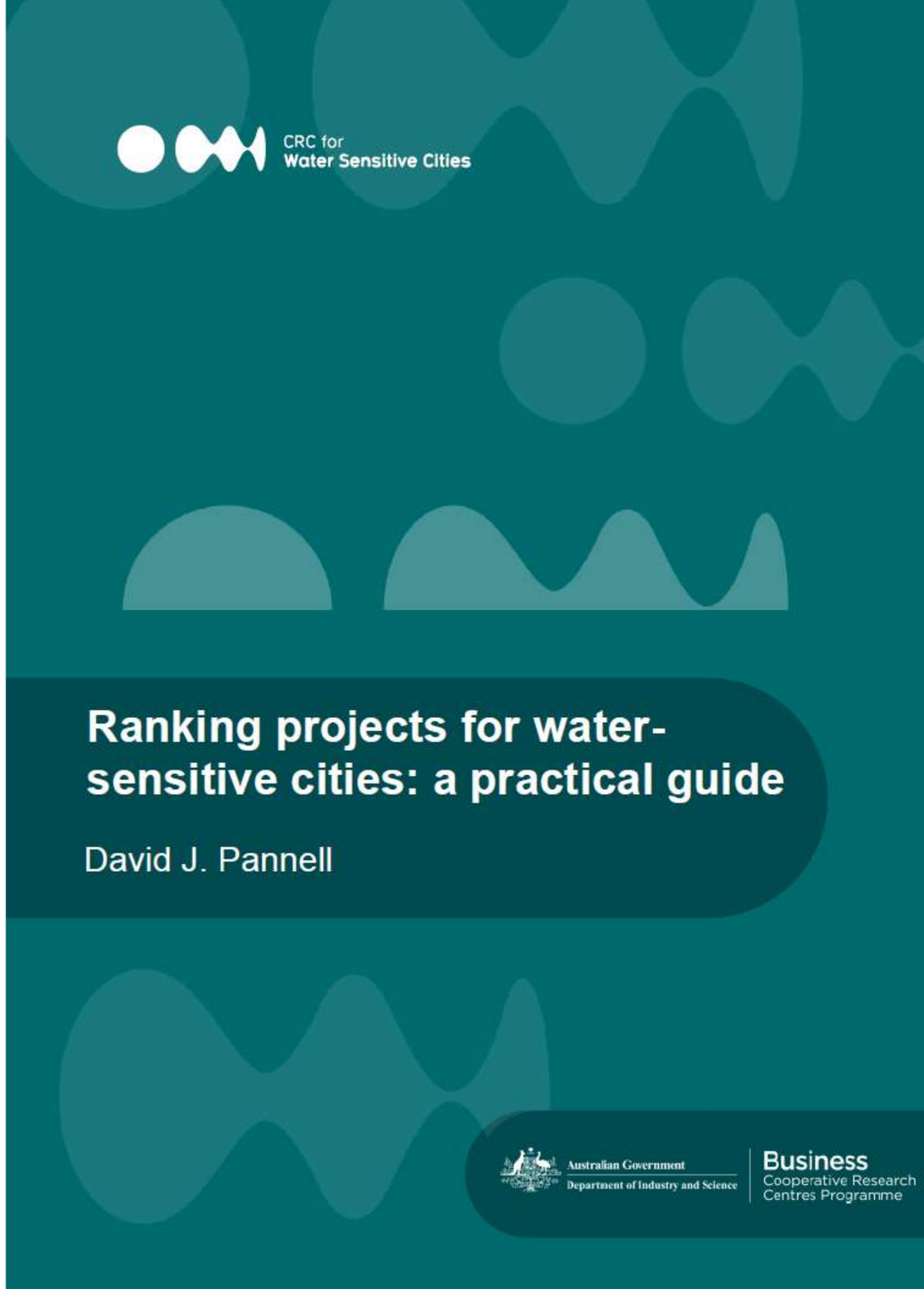
- Need to prioritise investments in water-sensitive cities
- Present convincing business cases to decision makers
- Strong interest from partners in CRC for WSC in tools to help with this

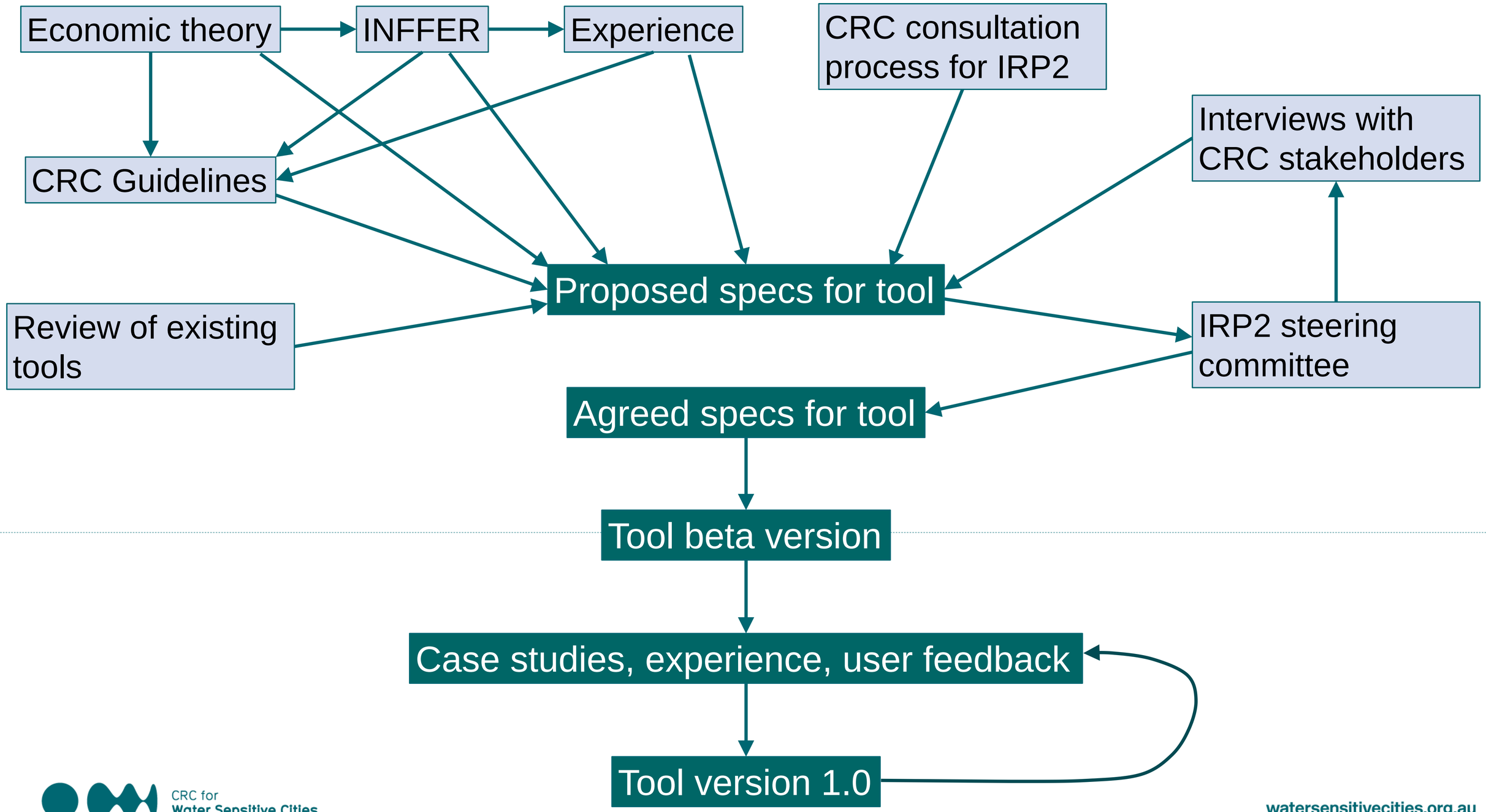
The tools

1. A tool to provide defensible estimates of the monetary-equivalent values of non-market benefits (social and environmental) (Sayed will present)
2. A standardised tool to conduct Benefit: Cost Analysis (BCA)

Benefit: Cost Analysis

- Guidelines on ranking water-sensitive projects
  - Free to download from the CRC web site
- For ranking, not business cases
- Identify which project options are most worth developing business cases for

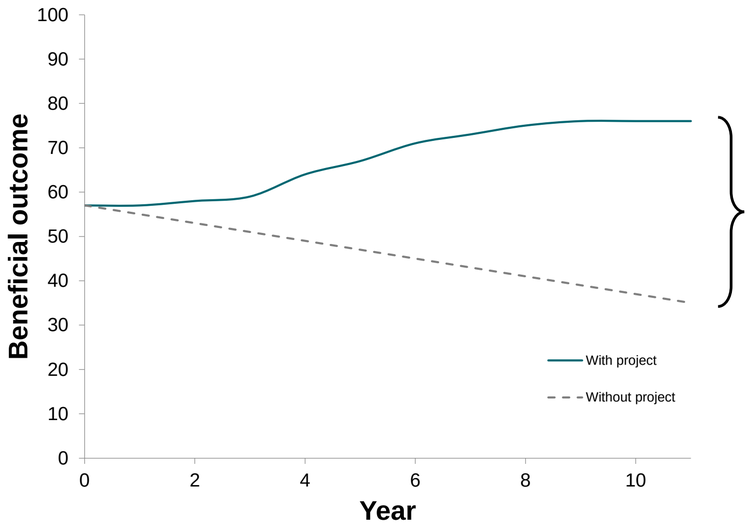


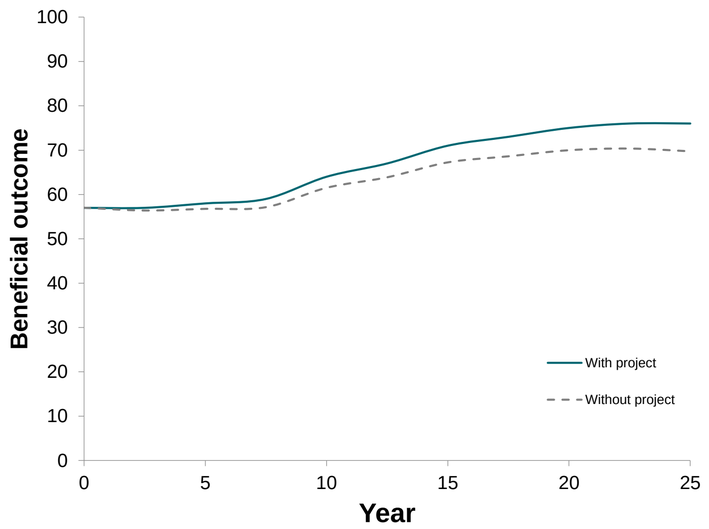

Economic theory
INFFER
Experience
CRC consultation process for IRP2
Interviews with CRC stakeholders
CRC Guidelines
Proposed specs for tool
Review of existing tools
IRP2 steering committee
Agreed specs for tool
Tool beta version
Case studies, experience, user feedback
Tool version 1.0

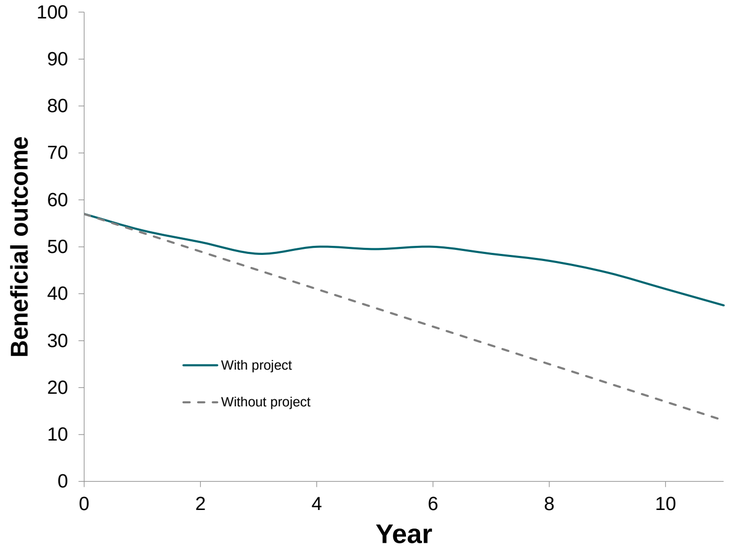

Economic theory

The with-versus-without principle

- Benefits of a project based on comparison of outcomes with the project versus without the project
- Not before versus after







The with-versus-without principle

- Seems common sense, but people often get it wrong
- e.g. 15/16 conservation planning tools got it wrong (Maron et al. 2013 *Conservation Letters*)
- Need to clearly define business-as-usual scenario (“counterfactual”)
- All investment options compared to that
- Both “with” and “without” scenarios are predictions – both have uncertainty

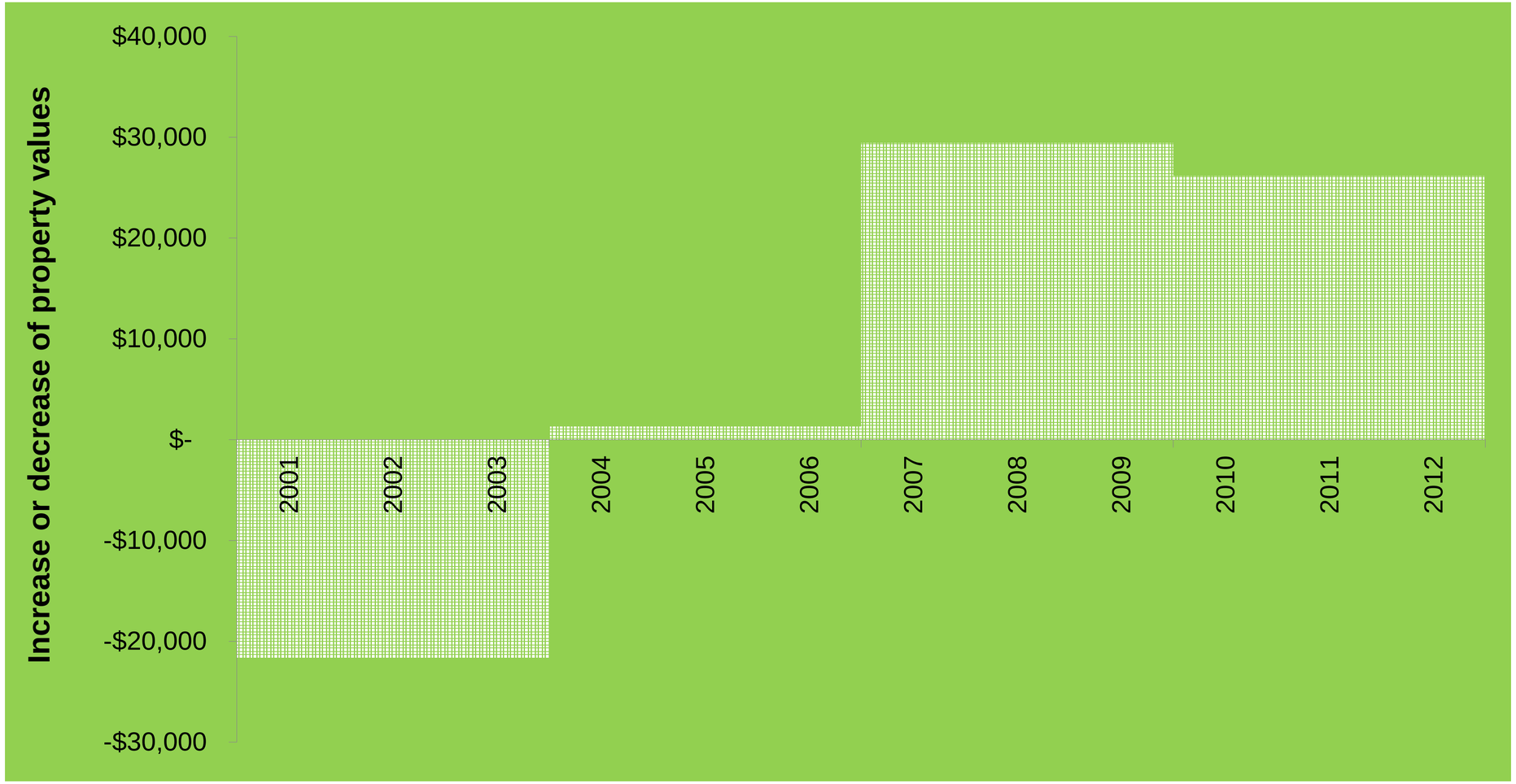
Need to precisely define the project

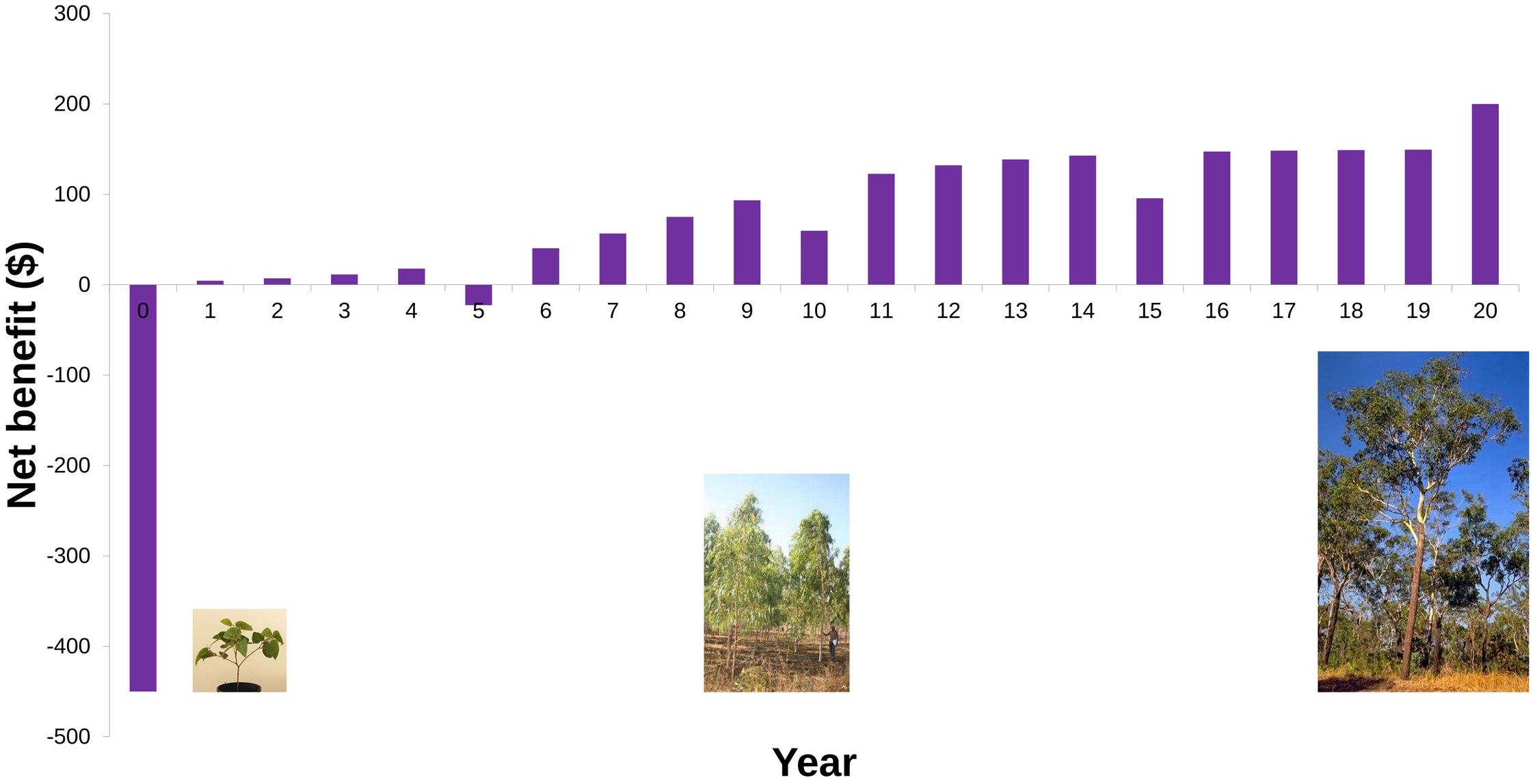
- Results for with-project scenario depend on exactly what will be done in the project – what are the project actions?
- Not just about the target outcomes (which are often aspirational)
- It’s about estimating realistic outcomes for those particular project actions

Accounting for time

- In many projects, benefits occur some time after the main costs
- e.g. vegetation established for “living stream”
- Has to grow before it delivers full benefits

Delayed benefits




300
200
100
0
-100
-200
-300
-400
-500
Net benefit ($)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
Year

Comparing values at different times

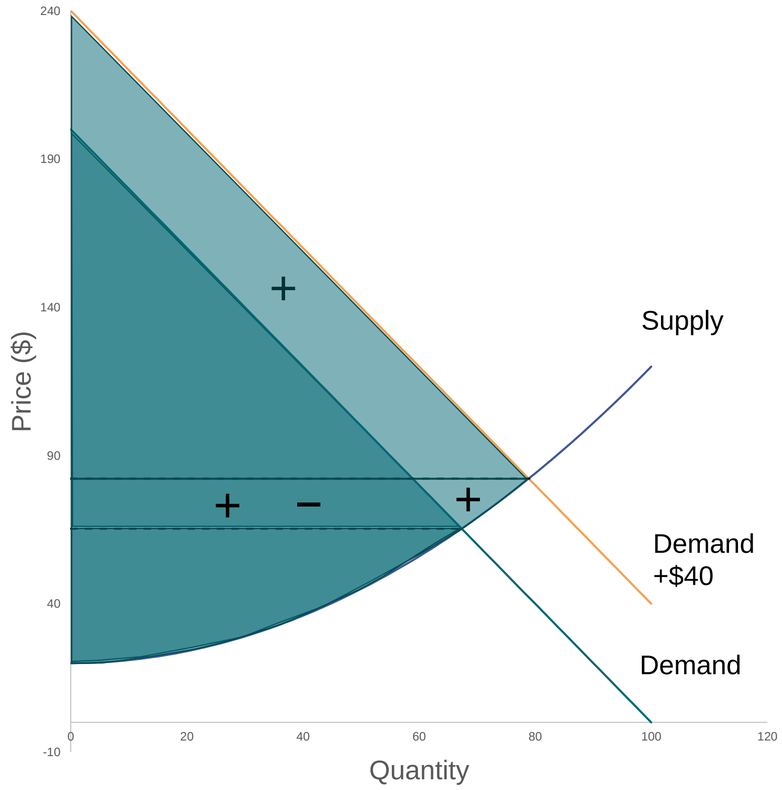
- How can you compare costs in year 1 with benefits in year 20?
- Account for “interest” cost of up-front costs (return on best alternative investment)
- Also allow for interest on benefits that occur early
- Compound interest through until year 20
- Are total benefits (plus interest on earlier benefits) big enough to outweigh total costs (plus interest on costs)

- Equivalently, discount later benefits and costs back to the present
- Is PV(benefits) > PV(costs)

Quantifying benefits 1

- Market benefits
  - Bought and sold
  - Has a price
  - Price changes as supply of the good changes
  - Price changes as demand for the good changes
- Use standard economic supply and demand models to estimate the benefits of a project
- e.g. a commercial water-saving technology (shower head)

Effect of a subsidy



Quantifying benefits 2

- Non-market benefits
  - No market, no observable price
  - We still want to measure them in monetary-equivalent terms
  - A range of innovative methods
- Examples
  - Ecological improvements
  - Aesthetics
  - Recreation in public spaces
  - Health
  - Thermal comfort
- Sayed will cover

Quantifying benefits 3

- Cost savings or delays
- Cost savings
  - No need to treat water in a catchment if people excluded
  - The cost reduction is a benefit
- Cost delays
  - Replace infrastructure after 20 years instead of 10
  - Benefit is saving in interest
  - The cost itself may change (difficult to anticipate)

Quantifying benefits 4

- Reduced risks
- Reduced probability or reduced cost of an adverse outcome
- Urban flooding
- Benefit
  - Reduction in (cost of incident) × (probability of incident)
  - Weighted by discount factor depending on timing


Experience

“Planning Fallacy”

- People tend to be overly optimistic when planning a project
- Exaggerating benefits by 100% or more is common
- Some projects more than others?
- Strategies
  - Ask for evidence for numbers used
  - Include “consistency checks” about compliance, budget and risks
  - Support a system of peer review of assumptions
  - Be explicit about project risks

Project risks

- Different from benefits due to risk reduction (floods)
- Various factors can cause project failure
  - Technical risks
  - Socio-political risks
  - Financial risks
  - Management risks
- Include these risks explicitly and quantify them
- Weight benefits by probability of success

Uncertainty

- BCA is demanding of numbers
- There is always uncertainty about the numbers that are needed
- Strategies
  - Rate the quality/certainty of the numbers used
  - Identify the numbers with high uncertainty
  - Ask what will be done to reduce uncertainty

    Nothing

    Research

    Pilot test

    Adaptive management
  - Guidelines on sensitivity analysis

Setting targets

- Many project proposals specify aspirational targets, but don't properly assess whether they are likely to be achieved
- Better approach
  - Set preliminary target
  - Design project
  - Evaluate likely outcomes realistically (technical feasibility, project risks)
  - Use those realistic outcomes as the project target
- Better for evaluating project and monitoring project success
- Specify them as SMART targets
  - Specific, Measurable, Achievable, Relevant and Time-bound
- "Reduce N concentration in the Canning River (3-year rolling average) to XXX by 2030"

Review of existing tools

Tools reviewed

- **1.3.1 BCA tools reviewed**
- Catchment Management Investment Standard (detailed guidelines on investment and a tool)
- INFFER (Investment Framework for Environmental Resources)
- The i-Tree suite of tools
- AWRCoE Recycled Water Economic Assessment Tool
- Blackspot Funding Benefit Cost Ratio tool
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- **1.3.2 Tools examined that are more relevant to the Benefit-Transfer Tool than to the BCA Tool**
- CIRIA BeST (Benefits of Sustainable Drainage Systems Tool)
- Natural Capital Coalition
- Social Environmental Tool (SET)
- Ecological Accounting Protocol – A Tool to Calculate the Opportunity Cost of Drainage Infrastructure
- New Jersey developer's green infrastructure guide
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- **1.3.3 Tools we were unable to get a copy of**
- MetroNet by the Metropolitan Water Directorate, NSW, https://www.metrowater.nsw.gov.au/
- NRM North WSUD Implementation Decision Support Tool. Benefits assessment is primarily qualitative; water quality improvements are quantified. Designed for local context (Mann, 2016).
- Infrastructure Sustainability Council of Australia (ISCA) Rating tool – seems like it may not be a BCA tool in any case.
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- **1.3.4 Not reviewed in detail due to narrow focus**
- Green values national stormwater management calculator (US). Not a BCA.
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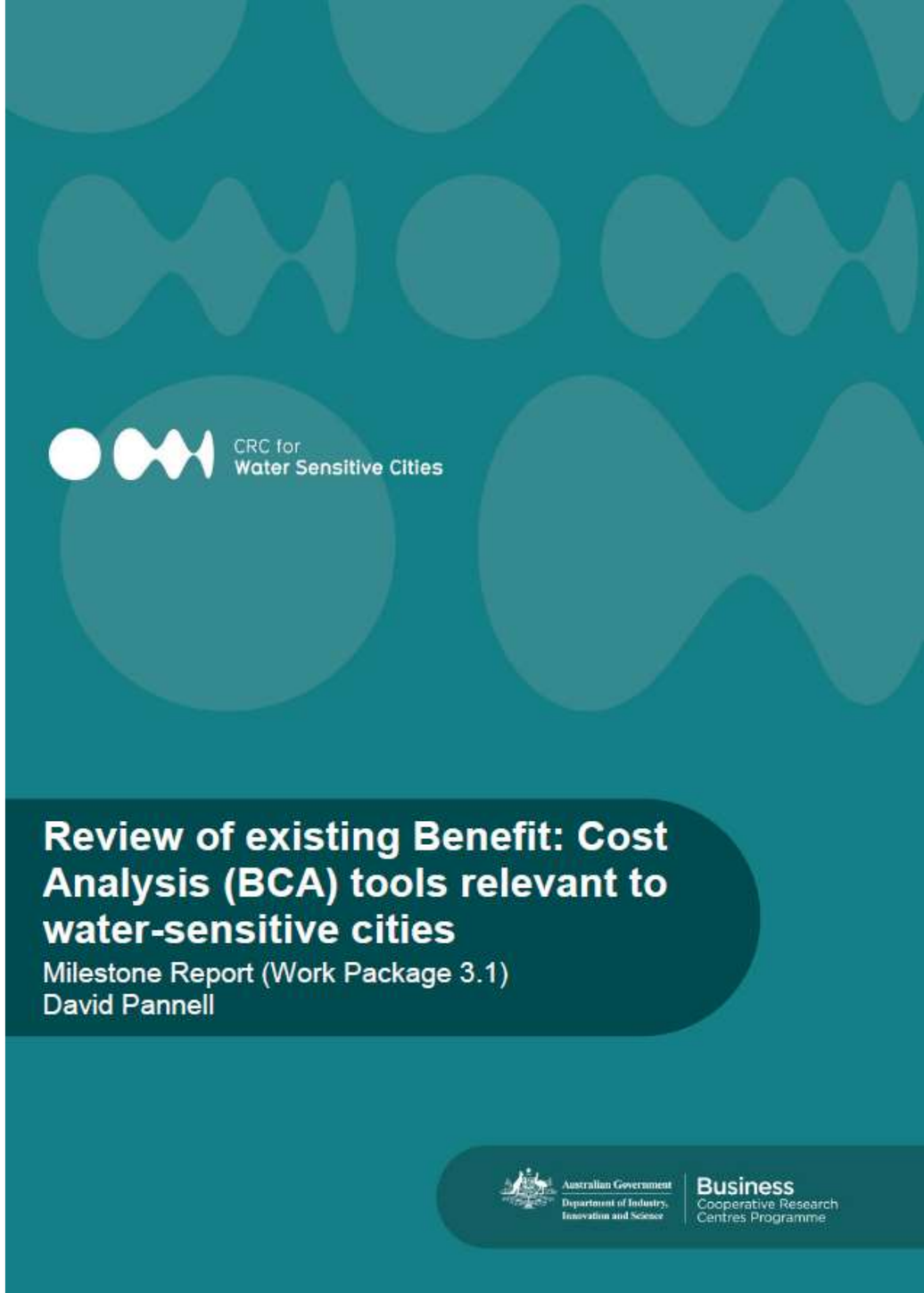
- **1.3.5 Guidelines or protocols without tools**
- VISES Green Infrastructure Economic Valuation Framework (usefully complements our BCA tool).
- PRINCE2 (https://en.wikipedia.org/wiki/PRINCE2). Too general and comprehensive for our purpose. It is more of a project management method than a BCA tool.
- Perhaps explain why in a couple of sentences

Review of existing tools

- They all specialise in particular project types: catchment projects, trees, water recycling, water quality
- No existing tool covers the full range of relevant benefit types
- Some not BCAs
- Most have ideas worth learning from and weaknesses worth avoiding
- Report available on request




Consultation with stakeholders

Consultation

- Every organisation sees economics as important
- Some use BCA a lot – mostly larger ones
- Most BCAs commissioned externally – some internal
- Smaller organisation generally lack economics expertise

Consultation

- Some economists say don’t bother
- Risks with putting economics into hands of non-economists
- Prefer to make their own BCA frameworks – customised for each project
- Others value a standard approach for the sector
- Needs to cope with broad range of project types

Consultation

- Smaller organisations
- Need support – build capacity
- Want something “simple”
  - Well-chosen simplifications
  - Limits to how simple
- “BCA support tool”
  - Understand key principles
  - When is BCA needed?
  - Informed commissioning and interpretation
- Training

CRC for
Water Sensitive Cities

What’s next

- Complete initial tool in March
- Test internally
- Detailed documentation
- Beta version released publicly in April

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Investment Framework For Economics of Water Sensitive Cities


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